DELTA LEVEE AND CHANNEL MANAGEMENT ISSUES

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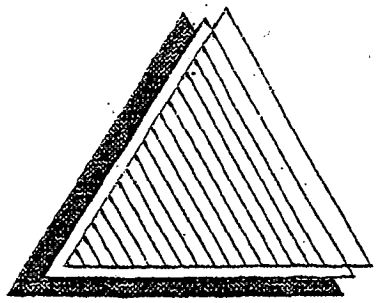

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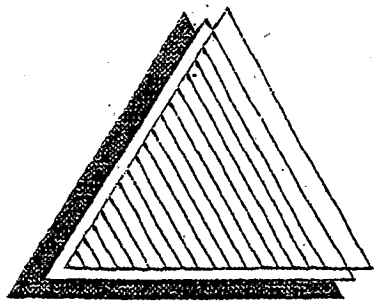

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DELTA LEVEE AND CHANNEL REPAIR AND MAINTENANCE

INTRODUCTION

The purpose of this paper is to describe some of the issues surrounding levee and channel management in the Delta and the inherent conflicts which arise between retaining and restoring fish and wildlife habitat on levees and maintaining those levees for flood protection. The principal catalyst for this disagreement over levee values has been the Delta Flood Protection Act of 1988 (SB-34) program for levee repair and maintenance and thus an overview of the SB-34 program and its implementation is presented here. The fish and wildlife values associated with the Delta's levees and the channel system defined by these levees, and the wildlife values protected by the Delta's levees are also described in the appendix to this paper.

This paper deals mainly with "non-project" levees, that is, levees which are not part of the Sacramento Flood Control Project constructed by the U.S. Army Corps of Engineers. While the issues are similar, the following discussions do not in all cases apply to the "project levees" - although wildlife resource managers express similar concerns over the way that many of the issues discussed in this paper are addressed for the "project levees".

SB-34 allocated $120 million - 12 million per year from 1988 through 1997, for two program components addressing "non-project" levees. These components are the Special Flood Control Projects for the eight western Delta Islands ($6 million per year) and the Delta Levee Subvention Program ($6 million per year). These programs are discussed in more detail later in this paper.

"Non-project" levees are maintained, repaired, and upgraded by local reclamation districts in accordance with the States Flood Hazard Mitigation Plan (FHMP) for the Sacramento-San Joaquin Delta . Portions of the cost for implementing the plan are eligible for reimbursement through the SB-34 program (up to 75% for maintenance and rehabilitation and up to 100% for mitigation work). In contrast, "project levees" are maintained under separate funding sources by Reclamation Districts or by the State of California, Department of Water Resources, under agreement with the Corps of Engineers, according to standards set forth in separate federal legislation.

Efforts by levee districts and other agencies throughout the Delta have historically focused on protecting farm land, homes, urban areas, and other public developments such as highways, railroads, and major aqueducts. Until recent years little attention was paid to how these efforts affected fish and wildlife and their habitat. As a result of the environmental

mandates expressed in SB-34 and SB-1065 - which directed that the Department of Fish and Game determine that any project funded under the program will not result in a net long term loss of habitat - the impacts of levee and channel work on fish and wildlife resources have taken a much higher profile.

Efforts to maintain and develop high value wildlife habitat on the levees is considered by many levee maintenance managers a threat to the structural integrity of Delta levee systems and it is considered by others to be a barrier to routine inspection and maintenance of the system. Further, during floods the dense vegetation - which is an important part of high value habitat - can obstruct an effective flood fight effort. Despite the disagreement over the emphasis which should be placed on flood protection versus wildlife habitat, there seems to be general agreement to the benefits of protecting the Delta islands and their valuable wildlife values.

The components of these issues are the subject of the remainder of this paper.

LEVEE AND CHANNEL MAINTENANCE ISSUES

Dredging

The potential exists for dredging activities to result in local, temporary adverse impacts on Delta channel water quality. These impacts may include the potential release of toxic pollutants into the surrounding water, where dredging occurs adjacent to marinas. While there always is a slight potential for these impacts to occur during levee maintenance and repair projects, there have not been any identified problems of this nature to date as a result of SB-34 sponsored projects.

Temporary reduction in dissolved oxygen levels resulting from increased organic matter (which absorb oxygen for decomposition) and increased turbidity levels are also potential impacts which may occur during dredging activities. The severity of these impacts if any, depends on the location, construction method, and time of year. Eggs and larvae of fish such as longfin smelt, delta smelt, and striped bass, which may be present between January and July, are generally more susceptible to these adverse environmental conditions than adult fish.

While both fishery resource managers and levee maintenance managers seem to agree that these potentials exist, some levee maintenance managers observe that there have not been any documented cases in the SB-34 program to date and question whether the threat is overstated.

Concerns about the potential of adversely impacting species listed under the Endangered Species Act has resulted in a severe limitation on dredging activities. As a result, dredging has been limited to principally the months of July and August thus effectively limiting the construction season to 60 days for levees which require work in the channels. Fisheries data is currently being collected to better define critical periods and location so that consideration can be given to expanding this dredging window. Until this is completed, there is a significant risk that fill material from dredging will not be available to maintain and restore levees.

Concerns have also been expressed by fisheries resource managers that if current dredging techniques which avoid work at the levee toe are abandoned there is a potential that dredging and other bank stabilization projects (i.e. riprapping) may result in the direct loss of habitat for young chinook salmon and their prey. These impacts result from removing aquatic vegetation, dead branches and snags and "shaded riverine aquatic habitat" from the toe of the levees. While there have not, to date, been any instances of such direct loss as a result of dredging activities carried out by projects administered under SB-34, fishery resource managers believe that continuing attention by levee maintenance managers needs to be applied to protecting these aquatic habitats for all projects.

Levee Maintenance Activities

Prior to the development of more recent levee management techniques, conflicts between maintaining levees and sustaining wildlife habitat on levees seemed to be inevitable. The Delta levees provide and protect important wildlife habitat for numerous species. Important riparian habitats are found on the water and land side of the levees and berms.

Installation of revetments and riprap typically requires the removal of vegetation from maintenance sites. Fishery resource managers have voiced concerns over the potential that removing streambank vegetation and preparing the banks for protective materials may release organic matter to the stream system and increase turbidity levels. If this elevated level of organic matter occurs there is a potential that smothering of fish and eggs and larvae downstream or upstream (depending on tidal flow conditions) could occur. It is also possible that reduced dissolved oxygen (DO) levels, impacting both fish and larvae could occur. There have not been any observed occurrences of high turbidity levels or reduced D.O levels associated with the SB-34 projects, however, it is important that levee repair and maintenance project managers be aware of the potential and continue to take steps to avoid these impacts.

Levee maintenance managers are concerned that uncontrolled levee vegetation on levees is a potential hazard. They believe that trees with extensive root systems can create paths for the piping of water through the levee, potentially leading to levee failure. Some trees are subject to being toppled by wind, taking large segments of the levee with them in their fall. Dense foliage or undergrowth can obscure the visibility of the levee face and impair inspection of the levee. Dense vegetation may also present an obstacle to emergency flood fights, further exacerbating the threat of flooding.

Some wildlife, including beavers, muskrats, and ground squirrels, can pose a direct threat to levee stability. As with vegetation, the degree of threat varies with the location and species. Between wildlife resource managers and those responsible for maintaining Delta levees there are differing opinions and observations as to whether the threat is real or more a perception of a threat. A significant difference of opinion revolves around allowing certain types of vegetation to grow on levees (particularly fruit and nut producing plants).

Most levee maintenance managers observe that these types of plants attract animals whose colonies and burrows weaken levees and tend to induce water through the levee. Dense levee vegetation can act as barrier to visual detection of burrowing rodent colonies. Many levee maintenance managers consider that biological control methods proposed by some resource managers for controlling burrowing rodents on levees are not effective due to their zero tolerance threshold for these animals in levees. They observe that biological control measures (such as introduction of predators and vegetation management) may assist in population reduction but is not generally acceptable to levee maintenance managers as the single control method. Where this method is utilized it is generally part of an integrated approach also employing chemical control methods where the biological methods are not 100% effective.

In contrast, many wildlife resource managers believe that recent evidence demonstrates that frequent stripping, burning, mowing, grazing, or other practices which create large areas of sparse vegetation actually encourage rather than discourage ground squirrel populations. Approaches to biological management of ground squirrel colonies are under study which include increasing vegetative cover for predator hiding and perching. They believe that these methods would encourage natural predators of the ground squirrels, gophers, and other rodent pests, thus controlling this problem naturally. However, progress has been slow in documenting the value of these methods and developing acceptance among those responsible for levee maintenance for the reasons cited above.

There seems to be general agreement that the burrows of beavers and muskrats are a problem. In an undisturbed setting, these animals construct lodges in marshlands and dig burrows in wide riverside berms where food is plentiful and they are relatively isolated from predatory animals. Channel banks may also be used, but are generally a less secure location. In the Delta, available habitat for these animals is scarce, and while they do use marshlands and berms to the extent they are available, they also burrow into unriprapped banks. Beavers burrows weaken levees and can lead to levee failure.

The paragraphs above summarize some of the resource conflicts and the disagreements over the priority of safety verses fish and wildlife resources which typify the Delta levee and channel maintenance programs. While considerable progress has been made toward resolving the conflicts and disagreements since the start of the SB-34 program, there still remains some issues to resolve. The following section describes some of the initiatives which are underway to address the remaining issues.

CURRENT INITIATIVES TO ADDRESS THE DELTA LEVEE AND CHANNEL CONCERNS

Innovative programs to address these levee concerns are being developed and implemented at both the State and local level.

These initiatives are being pursued in recognition of the habitat value of the levee system and represent active attempt to protect fish and wildlife values while still maintaining appropriate levels of flood protection.

These initiatives include programs for levee maintenance activities and for dredging activities.

Levee Maintenance Activities

Proposed vegetation guidelines are being developed for local levees that will emphasize the retention of certain vegetation types and provide for vegetation mitigation and enhancement. The establishment of these vegetation types on levees has not historically been endorsed by the SB-34 program. The proposed vegetation guidelines will be in accordance with the Hazard Mitigation Plan (HMP).

Two demonstration slope protection projects have been implemented as part of the SB-34 program using materials other than riprap. These materials were chosen due to their potential to accommodate substantial vegetation regrowth while providing protection from erosion. Several hundred feet of Armoflex and Tri-Lock articulating blocks were placed on some Delta levees in 1993. DFG planted riparian vegetation on the sites and is monitoring the regrowth. This erosion protection method is two to three times more expensive than riprap, therefore its use may be limited.

Most reclamation districts strongly believe that riparian vegetation can be easily and inexpensively reestablished on riprap. Vegetation on riprap will grow naturally, without any planting effort. Current maintenance practices however do not allow vegetation to establish on riprap for reasons discussed earlier. The new vegetation management guidelines if approved and implemented may result in a significant cumulative enhancement of riparian vegetation over existing conditions in the Delta.

Innovative projects such as the water side berms project at Staten Island discussed later in this paper and DWR's proposed levee improvement project at New Hope Tract and Grizzly Slough are good examples of recent initiatives to improve flood protection while preserving or creating riparian and wetland habitat.

Dredging Activities

Fish exclusion devices such as curtains, nets, and sound barriers are being studied for use in keeping fish from entering the sites where clamshell dredging is occurring. If fish can be excluded from the work area, then dredging may be able to take place at any time of the year without creating impacts on aquatic "species of concern". Turbidity control has been used as an element of dredging activity to protect the eggs of delta smelt when the smelt are developing in adjacent shoaling areas. In addition, the use of clamshell dredges instead of hydraulic dredges can greatly reduce adverse impacts from dredging operations.

In order to understand better and define the distribution of salmon and Delta smelt in the Estuary during the year, data are being collected, analyzed and mapped in an attempt to define the seasonal distribution of salmon and smelt in the Delta. It is possible that these distribution maps will document longer periods of time in which minor dredging may be permitted in certain regions of the Delta without impacting these fish. Any broadening of the dredging window will be incorporated into DFG's 1601 Agreements for SB-34 work.

Interagency Coordination

The Resource Agencies' Delta Levee and Habitat Advisory Committee is working to:

1. Streamline Permits for Levee work in the Delta.
2. Explore the utility of Habitat Conservation Plans (HCP)
3. Provide Guidance on Habitat Mitigation Programs

A Subcommittee has developed options for better coordinating and streamlining the various regulatory actions by State agencies affecting delta levees. Resource Agency staff has also recently opened discussions with the Army Corps of Engineers and the Fish and Wildlife Service to secure a General Permit for levee work done pursuant to the SB-34/1065 programs. Other jurisdictional agencies will be encouraged to follow suit with program-wide permits/agreements for levee work that does not result in a net long-term loss of habitat.

The Advisory Committee will also explore the development of conservation plans to meet the requirements of the State and federal endangered species act. The goal will be to plan for the needs of listed species and their habitats while also allowing levee maintenance work to proceed.

The Department of Fish and Game will soon release its "Mitigation Guidance Document", a handbook for levee districts and landowners to assist them in developing habitat mitigation projects for levee maintenance. The document will endorse the use of mitigation banks for many of the common impacts to habitat on delta levees. These banks will both enhance the overall habitat quality and biodiversity in the delta, as well as provide additional options for levee districts to mitigate the site specific loss of habitat.

LEVEE REPAIR AND MAINTENANCE ISSUES AND IMPLEMENTATION OF THE SB-34 PROGRAM

The Delta Flood Protection Act of 1988, also referred to as SB-34, was enacted to facilitate accomplishing the traditional goals of Delta levee maintenance with enhanced state funding of these activities (Delta Levee Subventions Component) and to restore significantly degraded levee systems on New Hope Tract and eight key west Delta islands such as Twitchell Island, Webb Tract, and Sherman Island (Special Flood Control Project Component). Concurrently this program addresses the Delta's fish, wildlife, and plant resources most often affected by levee maintenance and restoration activities. The most significant component of the legislation from the fish and wildlife perspective is the mandate that levee maintenance and restoration activities partially reimbursed by SB-34 would not result in a net long-term loss of riparian, fisheries, or wildlife habitat. The DFG is required to make a finding to that effect before state reimbursement funds are disbursed.

The interagency coordination and district cooperation required to implement the subventions component of SB-34 (which reimburses portions of the maintenance costs incurred by local reclamation districts) has developed slowly reflecting both misunderstanding about implementation and some reluctance by reclamation districts to modify their levee maintenance permit acquisition practices. Many reclamation districts questioned DFG's jurisdiction in application of Fish and Game Code Section 1601, stream alteration agreements, to the SB-34 work. Others were concerned that funds needed to implement mitigation to ensure "no net long term loss" would reduce funding for badly needed levee maintenance and restoration. In follow-up legislation (SB-1065) the legislature provided specific guidance to the Resource Agency on how the environmental mitigation portions of the program - as well as other parts of the program - were to be implemented. Beginning in the fall of 1991 the persistent efforts of the reclamation districts, assisted by Department of Water Resources (DWR) and DFG staff, to implement the mandates of SB-1065 have resulted in progress towards meeting the habitat conservation goals originally posed in SB-34.

As an illustration of the degree of acceptance that the environmental goals of SB-34 have achieved among the reclamation districts, consider the following example of a local reclamation district. While not choosing to participate in the SB-34 program, the local reclamation district nevertheless took the initiative, in cooperating with DFG and DWR staff in designing and installing waterside berms to improve shaded river aquatic habitat and emergent wetland and riparian adjacent to Staten Island. Efforts such as these are an important step in searching for ways to improve fish, wildlife, and plant habitats using approaches compatible with levee and channel maintenance.

While the efforts to resolve the competing priorities between providing flood protection and preserving fish and wildlife habitat have occupied center stage to date, there is a larger issue of program funding looming on the horizon. SB-34 authorized $12 million of annual funding each year through 1997 subject to specific budget authorization. This authorization covers the combined work of the Special Flood Control Projects ($6 million) and the Subvention

Program ($6 million) which reimburses local reclamation districts for their work. It should be noted that the Subventions Program component funding was less than the $12 million authorized in 1991-92 and fell to $2 million in the 1992-93 fiscal year budget.

The SB-34 funding will expire at the end of Fiscal Year 97-98. While the program will have significantly contributed ($120 million) to addressing some of the most urgent levee problems, the many public values dependant upon sound levees will still be considerably at risk. The magnitude of this risk can be seen from the Army Corps of Engineers' report in the early 1980's which estimated in excess of $1 billion of needed Delta levee rehabilitation.

Funding in the amount of $3 million was provided to the Department of Fish and Game as part of SB-1065 to fund mitigation programs to offset for impacts incurred in the early years of the SB-34 program. DFG is currently in the process of identifying projects for this mitigation program, however progress has been slowed by the difficulties in finding riparian and aquatic habitats which will serve as offset for those impacted by the levee work. The legislation specifically state that the mitigation funds had to be expended by June 30, 1994 or the appropriation would revert and be lost to future mitigation work.

When the funding authorized by SB-34 expires in 1997, full funding for levee maintenance work will revert back to the local reclamation districts, in the absence of additional legislation addressing that issue.

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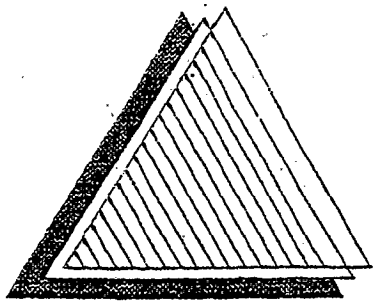
CONCLUSION

While the implementation of levee projects in the early years of the SB-34 program may have produced serious conflicts with fish and wildlife resources, the recent successful implementation of some programs suggests improved future effectiveness for the SB-34 program. With continued attention to the principles developed in these recent programs, future levee maintenance efforts should result in the maintenance of the Delta's levees and channels in a manner which concurrently protects fish, wildlife, and plant resources while also recognizing the environmental values on the islands protected by the levees.

Protecting the existing flood control and habitat values of the levees and the islands they protect while pursuing a goal of regaining some of the fish and wildlife habitat and aesthetic qualities which have been lost in the Delta is the challenge. Success in meeting the challenge will require that restorative and enhancement programs be implemented while applying present resource management practice to ongoing maintenance activities. Recent levee maintenance and design techniques maximize the avoidance of impacts on habitat and emphasize the natural retention of riparian vegetation while also allowing levee maintenance activities to continue. These techniques are only now being documented. Over the next few years it will become more apparent whether these techniques will accomplish the positive results that they promise.

While significant progress has been made toward stabilizing and improving the flood protection afforded by Delta levees, the challenge of the future lies in securing funding to continue this effort past the 1997 expiration of SB-34 funding. Innovative funding techniques need to be explored in order to secure financial participation by all parties that benefit from the protection afforded by the Delta levees.



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